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Congress Takes New Look at DNA Regulations

Half-human, half-animal hybrids were added to Washington's other fears in mid-November as Rep. Albert Gore (D-Tenn.) summoned nearly a score of witnesses from science and academe to play "what if" on the subject of genetic engineering with human DNA.

The hybrids were those conjured up by a sometimes breathless President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research. After two years of study, the Commission handed Gore its reports, "Splicing Life," in which it wondered: "Could genetic engineering be used to develop a group of virtual slaves—partly human, partly lower animal—to do people's bidding?"

Aside from this vision from Hieronymus Bosch, the Commission did a great deal of solid soul-searching, concluding that genetic tinkering with human beings had not crossed the bounds of ethical behavior—yet. The Commission advised, however, that it is time for the government to appoint a new super-entity to make sure that science doesn't "drift toward attempting to 'perfect' human beings" as it progresses toward treating human disease with recombined genes.

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The Commission may as well have been preaching to the converted. Over the past years Gore has taken the subject of the ethics of genetic engineering to heart, and has made it a frequent subject for his Subcommittee on Oversight and Investigations of the House Science and Technology Committee. Gore seems dedicated to fathering a new "oversight mechanism" to chaperone the new science, as "it becomes clear that our existing social and political institutions are ill-equipped to deal with the dramatic and rapid advances now being made in human genetic technology."

Among those joining him in the worried corner was Clifford Grobstein, Professor of Biology and Public Policy at the University of California, San Diego, who favors a national, non-regulatory commission on intervention in human heredity and development.

One of Grobstein's first principles would forbid genetic experimentation that is likely to increase the risk of "producing individuals whose hereditary capability is reduced." Grobstein also suggests a moratorium on genetic manipulation of human germinal cells—those carrying an individual's genetic characteristics into succeeding generations—for the purpose of "improving" offspring beyond what is attainable through normal reproduction. At the same time, germ-cell work aimed at eliminating the risk of genetic defects in a patient's offspring might only require review by medical groups and proof that the procedure doesn't affect the human gene pool. And treating human somatic cells *in vivo* to benefit an afflicted individual could simply follow existing peer-review channels.

Much was made of that dividing line between "gene therapy"—treating the somatic cells of patients—and "gene engineering" of the human species, which raised cries of "eugenics" and "playing God." Most who entered the debate appeared to have abandoned hope that existing university peer-review groups would have enough power or represent a broad enough spectrum of society to pick a path between the two. Nor does the Na-

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In Brief

The Department of Agriculture's frail program of competitive research grants continues to encounter hostility on Capitol Hill, which takes its cues on such matters from land-grant constituents who prefer the old system of non-competitive formula grants. Funded last year at $16.3 million, the competitive program—strongly backed by the Office of Management and Budget—went in for $22.9 million for fiscal 1983. The House, as usual, voted for a cutback, to $10 million. The Senate voted for $18 million. Tradition calls for a conference compromise somewhere between.

New on Capitol Hill: The House Select Committee on Children, a counterpart to the Select Committee on Aging. Overwhelmingly approved in this Congress, and sure to start up when the 98th convenes next year, the new committee will be limited to oversight and investigatory functions.

The White House Science Office is not unresponsive to the thought that it's time for Ronald Reagan to direct a ceremonial nod toward the scientific community, and that awards of the National Medal of Science—the US government's highest recognition of scientific achievement—might be just the thing. The medals, awarded by the President, with advice from the National Academy of Sciences, plus wherever else he chooses to seek it, were last presented by Jimmy Carter, who awarded 20 of them at a ceremony in January 1980.

...Researcher Who Was Punished Testifies

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tional Institutes of Health's seven-year-old Recombinant DNA Advisory Committee (RAC), which advises NIH and its grantees on procedures for DNA work, appear up to the job.

In fact, at the RAC's last meeting, in October, a proposal to require businesses to monitor the health of employees working with recombined DNA got a cool reception. The proposal came from the National Institute for Occupational Safety and Health, where according to the Reaganite view of things, holdouts from the Carter years are lurking. After NIOSH had rewritten its proposal to ensure that it didn't suggest anything mandatory (such as regular checkups and baseline blood samples for lab workers), the RAC agreed to accept it, but took no action beyond that. At various times, the RAC has tried to vote itself out of existence, and its stomach for the limelight is notoriously weak.

As an example of science "gone wrong," Gore pulled from science's pillory Martin Cline, the first and so far only researcher punished for attempting to use recombined genes to treat patients. Cline was stripped of much of his government stipend after inserting rebuilt beta-globin genes into the bone marrow of two young women, one in Israel, the other in Italy, who are suffering from incurable and fatal beta thalassaemia, a genetic disease.

Cline proceeded with his experiment in 1980 without obtaining the prior approval of biosafety committees at UCLA, where he once was chief of the university's hematology-oncology division. He resigned that post after the incident, but continues as Professor of Oncology there.

Cline, too, distinguished between gene therapy and gene engineering. What he did, he said, was therapy, no different from any Phase I, or experimental, clinical program to test a new drug. While admitting that circumventing UCLA's peer review groups was wrong, Cline observed: "In certain cases, however, it should be noted that ethics committees—because of understandable conservatism and caution—delay the introduction of innovative treatments that may help patients who are alive today and caught in the grip of an overwhelming disease." His two patients are still alive, he told the Subcommittee, though NIH's decision to withdraw support has left him unable to monitor whether the genes have proliferated or whether their insertion had any toxic effects, the primary objectives of his experiment.

What chance is there for a new, government-created commission, with power and a membership from science, academe, government and the public? Gore is ready to start promoting this new creature, but jurisdiction over current genetic research money lies with several Congressional committees, each of which will want a long, deliberate look at the idea. And at the White House, the notion of another government bureaucracy, perhaps with regulatory powers, isn't likely to set them dancing in the Rose Garden.

Whether some organized entity—or, for that matter, the human tinkering it would oversee—is really possible may be beside the point for now. As with most Congressional hearings, Gore's three-day gene-session at least drew headlines and got people talking about the ethics of engineering human beings.—CJ

Cline Defends Experiments

In testimony to Gore's Subcommittee, Cline vigorously defended the controversial experiment in which he inserted recombined genes into two beta thalassaemia victims.

"What are the ethical considerations that relate to this type of experiment?" he asked, and he continued, "There are no ethical considerations beyond those that relate to any type of novel experimentation with humans. . .I think DNA is really no different. There are obviously many things to learn about it. . .but I see no peculiar or novel types of consideration with this type of work.

"What sort of restriction or legislation do we need for this. . .? In my opinion, none beyond those that we already have in force relating to any type of experimentation."

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...Gore Says Public Fearful of Science

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Regarding his decision to go ahead with his experiment without permission: "At the time of the study I considered the initiation of those studies to be quite important and quite a serious matter. I actually considered the form in which those genes were inserted to be a relatively trivial aspect of the study, the reason being that. . .individual genes, whether they come together, recombinant or not, become recombined once they go into the cell.

"There is a certain biological reality there, a certain biological law, whatever the other laws might be, that these cells do become recombined in life. And it was an error to do it the way I did, but I considered it at the time to be a relatively unimportant aspect of the procedure. . ."

Of the possible dangers of experimenting with DNA in human subjects: "You have imprecise information when you have DNA. It's only been introduced into a relatively limited number of living animals, and that of only one species, so our knowledge there is incomplete. The dangers, theoretical dangers, of introducing DNA are in introducing the new DNA into undesirable sites, where it activates genes that are normally quiescent, and thereby, it damages the cell or changes its property and it behaves like a malignant cell. These are theoretical considerations. One can do certain analyses. . .(but) the probabilities of doing damage are small. . ."

On the notoriety and punishment he has drawn: "My own feeling is, I have some fair expertise in this area, where I've spent most of my life, learning the therapy of diseases. . .I think most of the outcry came from two reasons: one, because it did involve genes. . .and secondly, most of the outcry came from basic scientists who didn't really understand clinical investigation. . ."

Cline's inclination to blame much of the attention on the news media aroused this exchange:

Chairman Gore: "The public's view of science is changing rather dramatically. We have in this country always looked to science as a source of great hope and salvation and source of solutions for many if not all the problems we face. There is a growing feeling on the part of many that our reach is exceeding our grasp in too many instances, and that we are acquiring powerful new tools and not exercising the care and wisdom to wield them carefully. And I think the responsibility of individual scientists in this discussion is going to grow, must grow, if the public's confidence in science is to be maintained as it must be. And where the consensus in the science community is as strong as it was in this case, then it is hardly the news media that is the reason for the public wondering whether or not stricter controls are needed."

Cline: "I guess I'd only make one comment: That advances in science are generally not made by consensus."

Cline said he would welcome a moratorium, at least for now, on experimentation with germ line cells.

As to the necessity of some new governing body to guide science, Cline read the following passages from Lewis Thomas's book *The Medusa and the Snail:* "The easiest decision for societies to make in matters of this kind is to appoint an agency or a subcommittee within an agency to look into the problem and provide advice. The easiest course for a committee to take when confronted with any process that appears to be disturbing people or making them uncomfortable is to recommend that it be stopped, at least for the time being.

"I can easily imagine such a committee composed of unimpeachable public figures arriving at the decision that the time is not quite ripe for further exploration of the transplantation of genes, that we should put this off for a while maybe until the next century and get on with other affairs that make us less discomfited. Why not do science on something more popular, say, how to get solar energy more cheaply? Or mental health?

"The trouble is, it would be very hard to stop once this line was begun. There are, after all, all sorts of scientific inquiry that are not much liked by one constituency or another, and we might soon find ourselves with crowded rosters, panels, standing committees, set up in Washington for the appraisal and then the regulation, of research."

To this, Cline added a postscript: "So, I have to say honestly that I don't think it would be very effective, for two reasons. One is, whatever laws we write, the laws of nature are immutable, they're there.

"The second is that, man has certain inquisitiveness that one is not going to be able to regulate. Whereas we might be able to do so here, I don't think we can so for the rest of the world."

Academy Issues PhD Study

The median annual salary for full-time PhD scientists and engineers was $34,800 last year, $8500 more than for doctorates in the humanities. In both categories, however, women lagged far behind men in income. In science and engineering their median salary was $27,000 and in the humanities it was $23,200.

These and other data are in a new publication, *Science, Engineering, and Humanities Doctorates in the United States,* available without charge from the Office of Science and Engineering Personnel, National Research Council, National Academy of Sciences, 2101 Constitution Ave. Nw., Washington, DC 20418.

France: R&D "Modernization" Eludes the Ax

Paris. Though an economic tailspin has forced the Mitterrand goverment to scale down its activist designs, it appears that Jean-Pierre Chevenement, the ebullient Minister for Research and Industry, has been granted a rare dispensation to proceed with ambitious and costly "modernization" plans for science, technology, and high-tech industry.

Applied research, defined as research that will be of rapid utility to industry, is steadily gaining ground. After a large celebration October 14-15 at Nantes, in Brittany, to celebrate the activities of the National Agency for the Improvement of Research, which has a budget of $180 million to promote innovation, the Prime Minister, Pierre Mauroy, announced new tax breaks for companies that invest in research. The reduction will be equal to 25 percent of their annual increase in expenditures for research. This will be a real headache for the tax collectors, but industry is naturally pleased. All of this will apply for 5 years, starting in 1983 and ending in 1987. As of 1984, it should bring about $100 million in aid, especially to small businesses. The Government hopes that the number of French companies involved in research will go from 2000 to more than 5000 and is hoping for 10,000 by 1985.

The second "modernization" decided upon by Chevenement this fall is the "revitalization of the ranks" in biomedical research. Under the National Institute for Health and Medical Research (INSERM), biomedical science here has always been dominated by the "Mandarins." Like their Chinese namesakes, the potentates of medical research behave as tyrants: they are set for life in *their* laboratories, they train very few assistants capable of eventually replacing them, and they do not show much enthusiasm for recruiting young researchers. Pushed by Chevenement, the new director of INSERM, Philippe Lazar, announced to his 258 research directors, all brought together for the occasion in a large Parisian hotel, that henceforth their mandate as chiefs would be limited to 12 years.

What this means is that all the present glories of French medical resarch should have been pensioned off

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Medical School Enrollments: First Signs of a Slump

The number of medical schools and medical students in the US inched to an all-time record this year, but signs of a coming shrinkage in medical education are already visible, according to the Association of American Medical Colleges (AAMC).

Though a new medical school, Mercer, in Macon, Ga., came on line, raising the national total to 127, the number of first-year students declined by 77 from last year's figure, to a total of 16,567.

The freshmen drop was the first in 20 years, according to the AAMC, which attributed it to loss of federal capitation funds and some reductions in state support. Overall, 14 medical schols cut class sizes by at least five places, though eight others actually raised class sizes. Continuing an eight-year decline, applications dropped by 2.7 percent, to a total of 35,730, which works out to 2.2 applicants for each admission.

Because of transfer students from foreign schools, total enrollments are at an all-time high, 66,748. With a remarkably low attrition rate of 2.9 percent, that means that the production of new doctors won't decline for at least three years, according to AAMC President John A. D. Cooper.

Women accounted for 31.4 percent of the current freshman class, a slight increase over last year, and they now account for 29.4 percent of all medical students, compared to 24.3 percent in 1978-79.

While even with the cutbacks there appears to be an abundance of students for the available spots, some of the big state schools are rumored to be having difficulty filling their incoming classes with the kinds of students they prefer to admit. SGR is advised that one midwestern institution, faced with the prospect of vacancies because of unaccepted offerings of admission, actually pleaded with a number of applicants to take places in the freshman class.

Still, uncertain, however, is how far the decline in enrollments will continue and whether several weaker medical schools will fold. With student loans both onerous and in short supply, and medical schools abounding with tales of physician surpluses in attractive regions of the country, the profession isn't as attractive as it used to be. Add to that real and imagined reports of mounting external controls over the practice and reimbursement of medical care, and some career-shopping students are inevitably scared away.

Nonetheless, even in these hard times, the AMA reports that average physician incomes are around $80,000 a year, with many specialties running double and triple that amount.

Medicine may not be the golden profession that it was once, but relative to other lines of work, it's sufficiently rewarding, in money, prestige, and satisfaction, to continue to attract large numbers of able recruits.

...A Policy Overhaul for World Data Center

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years ago.

This new rule evoked a great outcry from its target. The professional press was unleashed and it compared this measure to revolutionary terror. Confronted with such emotion, Chevenement pulled back a bit: he stated publicly that "this regulation would not be retroactive." In other words, no one will be thrown out on the street. Calm has returned to medicine, and all in all, Chevenement has kept faith with his plan to put into place rules "which would favor team mobility and which would stimulate innovation," as he puts it.

However, his brutality was judged a bit excessive by the Elysee. President Mitterrand advised his Minister that it was high time to stop these frequent changes in research personnel. (After all, the President himself has been at the head of the Socialist Party for over 12 years.)

The third undertaking concerns a modification of the goals of the World Center for Data and Human Resources, established by that senior journalist, Jean Jacques Servan Schreiber, with the support of the President.

The World Center initially had an ambitious goal: the sharing of technological progress between the developed countries and those of the Third World. Servan Schreiber dreamt of putting together a micro-computer miracle which would allow both European management and an African peasant to have access to all the available data in the world. It is to work on this utopia that various prestigious foreign scientists agreed to join the World Center. But since the budget for the Center, about $10 million in 1982, and above all, the generous salaries of the foreign researchers, came to the knowledge of the French data processing community, a cabal has been unleashed against Servan Schreiber. It is true that the World Center by itself uses up half of the budget for data processing research of the National Center for Scientific Research (CNRS). The World Center is also cause for jealousy because its advanced computers make mincemeat of the French researchers who have been forced to date to use mainly domestically produced CII-Honeywell Bull equipment. The direct consequence of Servan Schreiber's cosmopolitan direction has been to remove this constraint, but only for his Center.

That's all that was needed to arouse the jealousy of the researchers at the CNRS and the universities. Their attacks have focused on the program and the goals of the World Center. A group of six professors of data processing and artificial intelligence, led by two of the best known among them, Jean Claude Simon and Marc Schutzenberger, has published a virulent diatribe in which they compare Servan Schreiber to the infamous Soviet biologist Lysenko.

A parallel, in fact, is possible between the man who states, "The science of personal computer processing puts in our hands the capacity to train men for new tasks, in all cultures and at all ages," and Stalin's protege, who promised an abundance of agricultural products by following a research path which was "revolutionary" and which also gathered to itself all the funds available for Russian biological research.

Jean Claude Simon continues his analogy by saying that: "The modern gulag, more than putting us [the university information specialists] in prison, is the depriving us of money."

The anger of the academics would not have found such formidable strength if it had not, at the same time, coincided with a discreet audit which the Minister of Research and Industry had made of the World Center after one year of operation. The assets proved quite small in relation to the "new data processing" programs which the Center has established outside the control of Jean-Pierre Chevenement. Ensuing accusations have caused a profound malaise in the hearts of the researchers at the World Center, and Servan Schreiber's credit with the powers that be has greatly suffered. He himself had to go and ask for the protection of the Minister for Post and Telecommunications (PTT). In France, this Ministry plays the part of a wise (and rich) lord in electronics. Louis Mexandeau, the Minister, accepted this alliance, but also immediately placed the Center under the control of a strict engineer from the ranks of the industrial services department of Telecommunications, which has never viewed with favor Servan Schreiber's initiative.

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Hammer to Award New Prizes

Armand Hammer, the oilman who chairs the President's Cancer Panel, has issued a reminder that he's personally offering a prize of $1 million "to the person or persons who find a cure for cancer similar to Dr. Jonas Salk's cure for polio."

In the meantime, Hammer, who is Chairman and Chief Executive Officer of Occidental Petroleum, is offering an annual prize of $100,000 for the breakthrough of the year in cancer research. He says he's put up funds to finance the awards for a decade.

The first of these relatively mini-prizes will be awarded December 3, upon the recommendation of Hammer, who's an MD; Vincent DeVita, Director of the National Cancer Institute, and Renato Dulbecco, a Nobel laureate at the Salk Institute.

Industry Maintaining High Level of Research

Industry has been sparing its own research laboratories from the fierce budgetcutting that it has otherwise resorted to during the long-running economic slump.

That's the finding of a newly issued survey of 75 major firms—including 14 of America's top 15 research performers—conducted last spring by the National Science Foundation. The respondents perform about 60 percent of all company-financed research in the US.(The data are contained in a "Highlights" report, NSF 82-324, available without charge from Division of Science Resource Studies, NSF, 1800 G St. Nw., Washington, DC 20550.)

On the bright side, NSF found that industrial R&D spending has maintained an average annual rate of "real" growth of 3 percent from 1980 through estimates for 1983. That's "in sharp contrast to the late 1960s and early 1970s," NSF notes, when indiscriminate wielding of the industrial budget ax held the average annual real growth to 1.5 percent in industry's funding of its own research. But the 1980-83 figures contrast poorly with the average 6.3 percent growth per year from 1975 to 1980.

NSF's surveyors, who did not identify any of the companies that responded, reported that "Many R&D officials commented that while R&D spending is increasing at a lower rate than in recent years, R&D budgets are doing relatively well compared with budgets in other company departments during the current tight financial squeeze."

Suggesting that management recalls some sad lessons from past recessions, the NSF report notes "growing awareness of the importance of research and development in achieving technological advances that will lead to greater productivity improvements. In addition," the report continues, "corporate R&D departments have been making a strong case for protecting R&D activities from budget cuts because of the favorable tax treatment they receive compared to other discretionary company expenditures, such as marketing outlays."

With industrial R&D spending for 1983 estimated at $40 billion, and the federal government's own R&D outlays projected at $42 billion, what is quite clear is that the US is off on an R&D spree that simply pales the spending of any of its industrial competitors.

The biggest R&D increases, NSF reported—17 percent in 1982 and 14 percent in 1983—are concentrated in the chemical industry in response to "recent breakthroughs in biology and chemistry, especially

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In the eyes of this department, Servan Schreiber's operation consists of having research done in France by over-paid American scientists, on software destined for Africans for use in hardware which will inevitably be produced in Japan.

The new goals of the World Center consist mainly of making sure that it will be useful to French industry.

The rebuilding of the French electronics and data-processing industries is a high priority of the Government. The masterplan specifies that within 5 years, the external commercial balance of the electronics sector, which currently runs a deficit of $3 billion, must become positive.

Chevenement is responding to the problem by throwing a good deal of new money into research, including $300 million in 1983 to launch projects in computer-aided design of very-large-scale integrated circuits. The quest, of course, is for new technologies, but what seems to be overlooked in the process is that France suffers from under-consumption of electronics and under-employment of data processing, and the shortfalls are not likely to be corrected by farfetched plans for exotic technologies.

A Coordination Committee for these electronic ambitions (which, by the way, does not have any full-time permanent members) is supposed to without delay give the green light to other "great national projects" within the domain of display devices and electronic storage-retrieval.

At the end of November PTT Minister Louis Mexandeau announced that his administration will budget about $1 billion over 3 years for another "great national project": the launching of cable TV. France, like the other European countries, does not have cable. The government is hypothesizing, rather boldly, that not only does the public expect more channels, but that it will not hesitate to buy all the panoply that a perfect TV viewer should have: several TV sets, videotape recorders, videodiscs, video cameras, all of which the government would like to see mass produced in France. Margaret Thatcher for Great Britain and Helmut Kohl for Germany are counting on the same thing.

In order to differentiate themselves from their neighbors, French scientists have been able to convince the Government not to create an ordinary TV cable network, but to have interactive networks which couple long-distance interaction with visual system. This leads the way for the visual-telephone. In addition, they have made an optical-fiber network prevail over a coaxial cable one. Who cares if this will cost more? This option will create important R&D work, which the critics are already calling the "audiovisual Concorde."—FS

IIASA Gets New Sponsor To Replace US Aid

American participation in the Vienna-based International Institute for Applied Systems Analysis (IIASA) has been partially salvaged by a switch to non-governmental support after the Reagan Administration decreed a US pullout.

Taking over from the National Academy of Sciences (NAS), which financed US participation with funds from the National Science Foundation, will be the American Academy of Arts and Sciences. But, even if all goes well financially, some substantial shrinkage is ahead for the US role in IIASA, which currently receives about $2.3 million in US dues.

The Arts and Sciences "goal" is $1.55 million for 1983, but, apart from about $150,000 that the NAS will provide from corporate contributions that it receives for systems analysis programs, the balance is yet to be raised. A spokesman for the Academy of Arts and Sciences said the short-term aim is to tap private sources, but the Academy would eventually like to see restoration of government support.

IIASA, an outgrowth of the Nixon-Brezhnev detente, initially suffered from generally cool assessments of the quality of its work, and then got tangled up in charges that the Soviets were using it as an espionage cover.

Upon coming into office, the Reagan Administration decided that better uses could be found for the funds contributed by NSF. The Academy of Sciences pleaded for a reversal, but got no place (SGR Vol. XII, No. 7).

The Academy of Arts and Sciences has entrusted its IIASA role to a committee chaired by Harvey Brooks, Harvard; Carl Kaysen, MIT, and Howard Raiffa, of Harvard, who was the first Director of IIASA.

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those involving genetic engineering.

Within the chemical industry, drug firms raised R&D spending 20 percent last year, and are projecting that same amount for this year, spurred on by tax credits and speedier product reviews by the Food and Drug Administration. In other industrial fields, growth of 14 percent was estimated for R&D by professional and scientific instrument firms; 9 percent in the electrical and communications equipment industry; 8 percent for the machinery industry.

Even the downtrodden motor vehicles industry was planning increases that would approximately keep its labs abreast of inflation—4 to 5 percent. The industry's officials pointed out, NSF said, "that R&D budgets have been less adversely affected than other company departments because of the clear recognition of the need for new technology."

In the Works: OTA Studies

In the Works, SGR's occasional series on policy studies underway at organizations in and around government, finds it easy to report the inventory at the Congressional Office of Technology Assessment, since OTA, unlike most organizations, periodically publishes a descriptive list of work in progress. So, we'll just list the titles, along with the word that Assessment Activities, *OTA's 42-page list of current and recently completed projects, is available without charge from Publishing Office, Office of Technology Assessment, US Congress, Washington, DC 20510; tel. (202) 224-8996).*

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The Future of Conventional Nuclear Power
Industrial Energy Use
Strategic Responses to an Extended Oil Disruption
Potential US Natural Gas Availability
Technology Transfer to the Middle East
Impact of Technology on Competitiveness of US Electronics Industry
Strategic Command, Control, Communications, and Intelligence (Classified)
International Cooperation and Competition in Civilian Space Activities
Technologies to Reduce US Materials Import Vulnerability
Nonnuclear Industrial Hazardous Waste
Wood: The Material, The Resource
Impact of Technology on Aging in America
Comparative Assessment of the Commercial Development of Biotechnology
Genetic Screening and Cytogenetic Surveillance in the Workplace
Plants: The Potential for Extracting Protein, Medicines, and Other Useful Chemicals
Water-Related Technologies for Sustaining Agriculture in US Arid and Semiarid Lands
Technologies to Sustain Tropical Forest Resources
The Medical Devices Industry
Medical Technology and Costs of the Medicare Program
Health and Safety Control Technologies in the Workplace
The Effects of Information Technology on the Structure of the Financial Services Industry
Information Technology, Automation, and the Workplace
Assessment of Approaches to Wetlands Use
Civilian Space Stations
Airport System Development.

One uncertainty about these relatively rosy figures arises from possible inducements for firms to fudge their R&D figures. NSF found that in the firms it surveyed, the R&D tax credit in the 1981 Economic Recovery Tax Act was "not an important factor in planning corporate R&D budget levels." But it also found that "To reap full tax benefits, some firms' accountants plan a closer look at what is classified as research and development to assure that appropriate technical improvements carried out in manufacturing units are included. This may increase R&D expenditures reported by companies for 1982 and 1983," NSF's survey authors point out.

Defense R&D Chief Hits Security Curbs

Confusion prevails on the muddled issue of security clamps on university-based research, the main reason being that the contending lower ranks are still running loose while the White House tries to make up its own mind.

But the latest bit of evidence to come to light supports the impression that it's the policymaking scientific illiterates, rather than the Administration's research managers, who are clamoring for censorship authority.

The new entry, recently made available to SGR, is a memorandum, dated September 21, 1982, from Richard DeLauer, Under Secretary of Defense for Research and Engineering, to the assistant secretaries for research of the three military services, plus the director of the Defense Advanced Research Projects Agency.

In the memo, DeLauer, apparently aiming to head off tighter restrictions, directs that all new basic research contracts and grants carry a provision requiring the researcher to provide the Defense Department simultaneously with a copy of whatever is submitted for publication or for inclusion in proceedings of meetings. DeLauer, noting that some agencies of the Department already require this procedure, directs that it be followed throughout the Department and be applied to renewals as well as new projects.

But then he goes on to tell the research chiefs that "It is extremely important that you realize that review of research papers is for comment and not for approval," and urges them to avoid steps that "would unduly restrain the open exchange of unclassified information among members of the scientific community."

The memo continues: "In the unusual cases where some degree of caution does seem to be indicated, the responsible Program manager shall advise the Principal Investigator in light of export control regulations. It is recognized that the current export regulations are not well-defined and it is important that the Program Managers do not apply unnecessary restrictions on the dissemination of research results which would be harmful to the strength and standing of the national research effort."

Meanwhile, the White House Science Office is drafting recommendations that are supposed to be responsive to the National Academy of Sciences report on *Scientific Communication and National Security* (SGR Vol. XII, No. 17, 18). But since Science Adviser George A. Keyworth publicly has expressed approval of the report, with minor reservations, the Administration's wagons-in-a-circle advocates are already sniping at that effort.

AAUP Security Statement

The Committee on Academic Freedom and Tenure of the Association of American University Professors has issued an analysis and statement of opposition to the Reagan Administration's efforts to tighten security restrictions over academic research. Titled "Academic Freedom and the Enlargement of the Classified Information System," the AAUP paper is available without charge from Jonathan Knight, Associate Secretary, AAUP, One DuPont Circle, Suite 500, Washington, DC 20036; tel. (202) 466-8050).

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